X. QUARTERLY ESTIMATES OF STATE PERSONAL INCOME

Quarterly estimates of state personal income begin with the first quarter of 1948. They are presented seasonally adjusted at annual rates. After seasonal adjustment, cyclical and other short-term changes in the states' economies stand out more clearly. Annual rates show the value that would be registered if the seasonally adjusted rate of activity measured for a quarter were maintained for a full year. The quarterly estimates are presented at annual rates so that the quarterly and the annual estimates may easily be compared.

Revision schedule for the quarterly estimates

The quarterly personal income estimates are revised on a regular schedule to incorporate source data that are more complete, more detailed, or otherwise more appropriate than the data that were available when the estimates were initially prepared and to incorporate updated seasonal factors. They are also revised to keep them consistent with revisions to personal income estimates in the National Income and Product Accounts (NIPA), to which they are controlled, and to annual state estimates, which incorporate more detailed and more reliable source data than the quarterly estimates.[1]

The first, or 'preliminary,' estimates for a quarter are prepared 3 months after the end of the quarter. The 'second' estimates for that quarter are prepared 3 months later. The estimates for that quarter continue to be revised every March and September in conjunction with the regularly scheduled revisions of the annual estimates (see table I).[2]

The estimates for the quarters of years for which annual estimates have been prepared are distributed from the annual estimates; the estimates for quarters after the last annual estimate are extrapolated from that estimate.[3]

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[1] The quarterly state estimates of wages and salaries are controlled to—that is they are made to sum to—the NIPA estimates of wages and salaries after adjusting for coverage differences, such as the exclusion of wages and salaries of U.S. citizens stationed abroad. See "Differences in geographic scope and in classifications between the NIPA and the state and county estimates" in Chapter I Introduction.

[2] For additional information, see Robert L. Brown, Bruce T. Grimm, and Marian B. Sacks., "The Reliability of the State Personal Income Estimates," *Survey of Current Business* 70 (December 2003): 52-66.

[3] Two ***distribution*** techniques are used: One uses seasonally adjusted monthly or quarterly source data as the indicator series, and the other uses an indicator series generated from the relationships between the annual estimates for each state and the Nation. For the latter technique, the indicator series is a weighted average of the "fitted values" from bivariate regressions of the annual state estimates on the corresponding national estimate and a simple proportionate share of the national estimate. Weights are based on the coefficient of determination (R^2) from the regression:

$$X_S^q = R^2(\hat{X}_S^q) + (1-R^2)\left(\frac{Y_S^t}{Y_N^t}Y_N^q\right)$$

The quarterly estimates are prepared in three steps. First, quarterly indicator series are prepared for the components for which state-level quarterly or monthly source data are available. Second, initial approximations of the quarterly estimates are prepared by distributing and extrapolating the annual estimates with the indicator series or according to the trend in the annual estimates (see footnote 4). Third, the initial approximations are used to allocate proportionately national control totals to states. Dual allocation is used to distribute annual estimates to quarters.[4]

After the second quarterly estimates are prepared, little new state-level quarterly source data become available. Therefore, the initial approximations of the revised quarterly estimates incorporate quarterly source data that are generally the same as the data used for the second quarterly estimates. The revised estimates differ from the second estimates mainly in their adjustment for consistency with revised national quarterly estimates and state annual estimates and in their adjustment for revised seasonal factors.

Control totals for the quarterly estimates

Quarterly national control totals for most components of state personal income are mainly derived from estimates of the corresponding component in the National Income and Product Accounts.[5] Two methods are used to prepare the national controls:

For years in which detailed annual state estimates have been made, the quarterly national control totals for a component are derived from the distribution of annual sum-of-the-states estimates. Quarterly NIPA estimates are used as the indicator series for the distribution. For quarters after the last annual state estimate, national control totals for most components of personal income are extrapolated using the percent change in the quarterly NIPA estimates.

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where X_S^q is the state indicator series, $\hat{X}_S^q$ is the "fitted value" for state S in quarter q of year t, Y_N^q is the national estimate for quarter q of year t, Y_S^t is the state estimate for year t, and Y_N^t is the national estimate for year t. $\hat{X}_S^q$ comes from solving, with quarterly-frequency data, a set of annual-frequency regressions estimated using rolling 7-year sample periods:

$$\hat{X}_S^q = \hat{a}^t + \hat{b}^t Y_N^q$$

where $\hat{a}^t, \hat{b}^t$ are the estimated slope and intercept from the regression with the sample period centered on year t (for the latest three years, the seven most recent observations are used).

Two ***extrapolation*** techniques are used: One uses the seasonally adjusted monthly or quarterly source data as the indicator series, and the other uses a slightly modified version of the weighted average formula:

$$X_S^q = R^2(\hat{X}_S^q) + (1-R^2)\left(\frac{Y_S^{t-1}}{Y_N^{t-1}} Y_N^q\right)$$

Notice that the ratio used in the second term refers to the previous year (t-1) whereas q refers to the current year (t) and that the "fitted value," $\hat{X}_S^q$, uses estimates $\hat{a}^{t-1}, \hat{b}^{t-1}$.

[4] See "Dual allocation" in Chapter XI Technical Notes.

[5] There is no national control total for the residence adjustment.

Exceptions to these general procedures are made in the case of wage and salary disbursements and farm proprietors' income:

Control totals for the quarterly estimates of wages and salaries.—In March, source data for wages and salaries that were not available when the NIPA estimates were prepared are sometimes used in the preparation of the control totals for the state estimates of wages and salaries.[6] The annual NIPA estimates of wage and salary disbursements for the most recent year are compared to an alternative annual estimate. The alternative is based primarily on BLS tabulations of wages and salaries of employees covered by unemployment insurance for the first three quarters and on a BEA estimate for the fourth quarter (based on CES data as described below). If the two series for the sum of all industries do not differ substantially, the NIPA estimates of wage and salary disbursements are used to prepare the control totals for the state quarterly estimates. Otherwise, the national control totals are derived for each industry using the alternative annual estimates.

Control totals for the quarterly estimates of farm proprietors' income.— For the preliminary and second state quarterly estimates, an annual estimate of farm proprietors' income for the current year is forecast using U.S. farm income forecasts from the U.S. Department of Agriculture (USDA). This annual control is then distributed using the average of quarterly NIPA estimates, if available, and assuming that income is constant for the other quarters.

Sources and methods for quarterly personal income by component

Quarterly state-level source data are available to prepare preliminary and second estimates of three personal income components: nonfarm wage and salary disbursements, farm proprietors' income, and state unemployment insurance (UI) benefits. The estimates of wage and salary disbursements are then used to estimate four other components of personal income: supplements to wages and salaries, construction proprietors' income, employee and self-employed contributions for government social insurance, and the residence adjustment. Quarterly estimates of the remaining five components of personal income: dividends, interest, and rent; personal current transfer receipts excluding state UI benefits; farm wages; pay of military reserves; and nonfarm proprietors' income excluding the construction industry are extrapolations of annual trends in state shares of the nation.[7]

Wage and salary disbursements.[8]—The preliminary quarterly estimates of wages and salaries for most NAICS sectors are extrapolated from estimates for the previous quarter by the percent change in employment using data from the Current

[6] The difference in the availability of the data for the estimates of wages and salaries is especially important because the revision to the national control totals of wages and salaries that are used in the preparation of the state estimates of wages and salaries in March sometimes foreshadows the direction and size of the revision to the NIPA estimates in June.

[7] These five components account for 39 percent of personal income for the nation.

[8] Wage and salary disbursements to private employees are estimated for all NAICS sectors. In addition, separate estimates are made for durable and nondurable manufacturing and for rail transportation and all other transportation and warehousing. Wage and salary disbursements to public employees are estimated for civilian employees of the federal government, active duty military, military reserves, and state and local government. All of these categories will be referred to as industries or NAICS sectors.

Employment Statistics (CES) survey of the Bureau of Labor Statistics (BLS) multiplied by a scaling factor.[9] The CES monthly employment data by NAICS sector are averaged to quarters and seasonally adjusted by BEA.

The scaling factors are the estimated coefficients from a set of regressions (one for each state) of state-specific wage growth computed from the most recent or latest set of BEA estimates on a set of preliminary state-specific wage growth rates defined as the unscaled state-specific percent change in CES employment. State-specific percent change in employment equals total percent change less the national percent change.[10]

The second quarterly estimates for these industries incorporate state payroll data from the Quarterly Census of Employment and Wages (QCEW) that are compiled in the administration of the state unemployment insurance system. The QCEW is a nearly complete census of wages and includes exercised stock options and other lump-sum payments that are not captured in the CES earnings data. The wage data are summed by NAICS sector and seasonally adjusted by BEA.

The wage and salary disbursements of farms, for both the preliminary and the second quarterly estimates, are based on trend extrapolation from the annual estimates. The preliminary estimate for the forestry, fishing, related activities and other industry is also based on trend extrapolation, but the second estimate is based on QCEW data.

Quarterly national payrolls from the Department of Transportation and annual State employment from the Railroad Retirement Board are used to prepare both the preliminary and second estimates of wage and salary disbursements in the railroad industry.

The number of personnel and average pay by service from the Department of Defense and payroll data from the Coast Guard are used to prepare both the preliminary and second estimates of wage and salary disbursements of active duty military personnel. The wages and salaries of military reserves are estimated by trend extrapolation.

Wage and salary disbursements to civilian employees of the Federal government, for both the preliminary and the second quarterly estimates, are based on CES employment data.

Supplements to wages and salaries.—Separate estimates are prepared of the two components of supplements to wages and salaries: (1) employer contributions for employee pension and insurance funds and (2) employer contributions for government social insurance. A national estimate of each of these components is available from the NIPA to prepare national quarterly control totals as described above. The NIPA, however, does not have quarterly estimates by industry. Annual state estimates by industry are therefore distributed to quarters as follows. Quarterly wage and salary disbursements for a given industry in a given state are scaled proportionately to sum to

[9] The CES survey collects monthly data (on form BLS 790) on employment. This survey of about 400,000 nonagricultural establishments across the United States is conducted by the state employment security agencies and coordinated by the Bureau of Labor Statistics. The data are released about 3 weeks after the end of the month. The data for average hourly earnings exclude bonus payments and several other forms of wages and salaries. The Survey is conducted for the pay period that includes the 12th of each month and is benchmarked annually to the Quarterly Census of Employment and Wages (QCEW), also from BLS.

[10] The regressions are estimated at the all-industry level. The same scaling factor is used for each industry within a state. See Jeremy J. Nalewaik, "Using efficiency tests to reduce revisions in panel data: The case of wage and salary estimates for U.S. states," BEA Working Paper WP2004-09, November 2004. This paper is available on the BEA website http://www.bea.gov/bea/regional/articles.cfm?section=papers.

that state and industry's annual employer contributions for employee pension and insurance funds (or employer contributions for government social insurance). These scaled wages are the initial approximations of quarterly employer contributions by state and industry. The initial approximations for a given quarter and given state are then summed over all industries. Dual allocation is used to reconcile these all-industry initial approximations with annual state control totals and quarterly national control totals of employer contributions. The result is a set of quarterly control totals for each state. A second dual allocation is then used to reconcile the quarterly initial approximations by industry for a given state with the state's quarterly and annual control totals by industry.

Quarterly employer contributions by state and industry are extrapolated using the percent change in wage and salary disbursements for that state and industry. The resulting initial approximations are then adjusted proportionately so that the sum over all states and industries equals the national control totals for employer contributions.

Farm proprietors' income.—Quarterly estimates of three components of farm proprietors' income are prepared separately: farm subsidies; farm proprietors' income excluding subsidies; and special adjustments for unusual occurrences, such as natural disasters. The quarterly state estimates of farm subsidies are based on annual trends. Annual estimates of farm proprietors' income excluding subsidies are distributed to quarters and extrapolated using monthly USDA data on cash receipts from the sale of farm products (summed to quarters) as the indicator series. Quarterly estimates of the special adjustments are based on state-level information from the USDA.

Nonfarm proprietors' income.—Annual estimates of construction proprietors' income is distributed to quarters and extrapolated using construction wage and salary disbursements as the quarterly indicator. National estimates of the rest of nonfarm proprietors' income is allocated by industry to states using shares of the nation from the annual state estimates. The most recent annual state shares are used to extrapolate to quarters for which there is no annual estimate.

Personal current transfer receipts.—The annual estimates of state (UI) benefits are distributed to quarters and extrapolated using monthly state UI benefits data from the Employment and Training Administration of the Department of Labor as the quarterly indicator after the data have been summed to quarters and seasonally adjusted by BEA. The quarterly estimates for all other personal current transfer receipts are based on trend distribution and extrapolation of the annual estimates.

Employee and self-employed contributions for government social insurance.—Annual estimates of employee and self-employed contributions for government social insurance are distributed to quarters and extrapolated using the estimates of wage and salary disbursements (discussed above) summed over all industries as the quarterly indicator.

Dividends, interest, and rent.—Both the preliminary and the second quarterly estimates of property income—personal dividend income, personal interest income, and rental income of persons—are derived from the trends in the annual state estimates.

Residence adjustment.—Three components of personal income—wage and salary disbursements, employer contributions for employee pension and insurance funds, and employee and self-employed contributions for social insurance—are subject to adjustment for residence. After preparing estimates of these components, as described above, they are combined into an aggregate called income subject to adjustment

(employer contributions are added to wages and employee and self-employed contributions are subtracted). The income subject to adjustment of each state is multiplied by a set of gross outflow ratios representing the proportion of the income subject adjustment in state i that is earned by residents of state j.[11] The outflows from state i to all other states are summed to yield gross outflows from i. The inflows to state i from all other states are summed to yield gross inflows to state i. Lastly, the residence adjustment for state i is computed as gross inflows to state i less gross outflows from that state.

[11] See Chapter VIII Residence Adjustment.